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EXAMINER

LANGMAN, JONATHAN C

ART UNIT	PAPER NUMBER
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1794

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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DETAILED ACTION

Election/Restrictions

Applicant's affirmation of the election of Group I claims 1 and 2 in the reply filed on September 15, 2008 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Claims 3 and 4 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected group, there being no allowable generic or linking claim. Election was made **without** traverse.

Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yushio et al. (US 6,423,400) in view of Yamakawa et al. (US 5,370,907) and Ito et al. (PCT/JP02/08223) (English translation is US publication 2004/0071945).

Yushio et al. teach a susceptor for semiconductor manufacturing equipment obtained by joining plural aluminum nitride layers, 11, with a high melting point metallic layer, 12, and an adhesive layer, 13 (abstract, and col. 6, lines 1-45). The metallic layer preferably has a thickness of 1-100 microns and preferably made of tungsten or molybdenum (col. 8, lines 18-35), or in a specific example has a thickness of 30 microns

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(col. 22, lines 35-40). After sintering the article, material properties were tested. These material properties included shear strength and warp. The warp was measured to be less than 1 micron/1mm (100 microns/100 mm) (see at least col. 23, lines 34-68). The bonding strength, (peeling strength) also known as the shear strength between the metallic layer and the ceramic substrate, which is the same context that the applicant uses, is measured and results are provided in Table 8. Yushio teach a shear strength of up to 3.3 kg/mm^2 and fails to teach a bond strength of greater than 4 kg/mm^2 .

Yamakawa et al. teach a high melting temperature metal consisting of tungsten and molybdenum on an aluminum nitride ceramic body, and a method of improving the peel strength (shear strength) (see at least abstract and col. 1, lines 25-65). By mixing tungsten and molybdenum in certain rations, shear strengths of greater than 5 kg/mm^2 are obtainable (col.3, lines 60-63) It would have been obvious to a person having ordinary skill in the art at the time the present invention was made to use these mixtures in Yushio's metal layer comprising molybdenum and tungsten on aluminum nitride ceramic because Yamakawa et al. teaches a higher bonding strength and therefore a better product with longer life ability due to the resistance to shear apart is obtainable. Yamakawa and Yushio et al. are both silent to the sheet resistivity of the metal layer.

However the applicant's teach in the instant specification that the sheet resistivity is a function of material and layer thickness (pg. 10, lines 16-30). It is noted that Yushio teaches the same materials and the same overlapping layer thickness ranges. The applicants further teach that the sheet resistivity can be reduced by decreasing the particle size of the tungsten and molybdenum materials forming the paste. These

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particle sizes are taught by the applicant's to be preferably 1-3 microns (page 14, lines 11-27). Ito teaches that when printing pastes of metal material, specifically, molybdenum and tungsten particles, the average particle size is preferably 0.1-5 microns, in order to ease in the deposition of the conductor containing paste (Ito et al., [0126]-[0128]). Therefore it would have been obvious to a person having ordinary skill in the art at the time the present invention was made to use Mo and W particles ranging between 0.1 and 5 microns in size for the deposition of a conductor paste on ceramic substrates because these particle size ranges are taught by Ito et al. to result in easier deposition. Furthermore it is noted that both Yushio and Yamakawa teach screen printing the conductor paste onto the ceramic substrate (col. 6, lines 55) and (col. 8, lines 48-54), respectively. The metal paste of Yamakawa et al. in Yushio et al utilizing these obvious particle sizes will inherently possess the instantly claimed sheet resistivity, since, Yamakawa et al. teach the same materials and Yushio teach the same thicknesses, and Ito teaches the obvious particle size distribution. It has been held that where the claimed and prior art products are identical or substantially identical in structure or are produced by identical or a substantially identical processes, a *prima facie* case of either anticipation or obviousness will be considered to have been established over functional limitations that stem from the claimed structure. *In re Best*, 195 USPQ 430, 433 (CCPA 1977), *In re Spada*, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The ***prima facie*** case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed products. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

The applicants teach that by using smaller particle sizes for the conductor material will result in lower sheet resistance but may result in high warp values. These warp values are taught by the applicant in the instant specification to be suppressed by the addition of an adhesive layer (instant specification, pg 16 lines 25-31). In light of the instant specification, since Yushio et al. teaches the same structure of providing an adhesive layer, 13, on top of the metal conductive layer, 12, it is assumed, expected, and inherent that the structure of Yushio will result in the same warp values as instantly claimed.

Regarding claim 2, Yushio et al. do not specifically teach a conductor paste of 50-90% however, as seen in Figure 3, the conductor paste covers a surface of the ceramic substrate in a portion falling within the instantly claimed ranges of 50-90%. As seen in the figure the conductive layer covers more than half of the ceramic substrate, and does not cover the entire substrate so less than 100%. Therefore it is said that the surface area of metal layer falls within the applicants claimed surface area.

Furthermore, Ito et al. teach similar configurations of the metallic layer on the surface of the ceramic substrate as seen in Figures 6-8. Ito go on to teach that the area where no conductor is formed above the bonding interface is preferably 5% or more ([0021]-[0022]), which allows for sufficient bonding strength. A surface area of 5% no conductor will have 95% conductor. Since Ito teaches 5% or more no conductor, this range goes all the way up to 100% no conductor, which correlates to 0% conductor. Thus Ito et al. teach 0-95% conductor surface area on the bonding interface of the substrate. It would have been obvious to a person having ordinary skill in the art at the

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time the present invention was made to use this conductor surface area including that presently claimed on the bonding interface of the ceramic substrate of Yushio et al., in order to provide maximum effective bonding strength.

Response to Arguments

The applicants argue the combinations singly and do not argue the combination of the references.

The applicants' state that when the claimed method of claim 3 is employed the AlN junction body having the properties of instant claim 1 is obtained. And further argue that "Other methods such as those in the prior art do not result in the present AlN junction body". These arguments are merely assertions and not supported by evidence.

It is the Examiners' position that the combination of the prior art as discussed above reads on the instant structure as claimed.

It is the Examiners position that since the prior art teaches the same materials and the same thicknesses for the refractory layer as instantly claimed, that the sheet resistivity that is instantly claimed is expectedly and inherently present within these layers.

The applicant argues that the refractory layer of Yushio would not result in the instantly claimed sheet resistivity because the sintered metal layer is joined to the surface of the ALN sintered plate via an adhesive layer of low melting glass. The high melting layer is preferably blended with a low melting point glass to increase the junction strength between the high melting layer and the AlN sintered plate.

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The Examiner disagrees. Yushio teach that the adhesive layer comprises 80% or more AIN (col. 9, lines 15-18). AIN is used by the applicant. Yushio does however, teach the addition of low melting glass into the refractory layers in order to obtain higher bond strengths, and uses the glass as a sintering aid.

The applicant then argues that the addition of glass to the refractory metal increases the sheet resistivity making it quite difficult to obtain the sheet resistance as contemplated. This may be true; however, the Examiner substituted the refractory layer of Yushio with the refractory layer of Yamakawa in order to obtain higher bond strengths as described above. Yamakawa teach that the refractory layer can be 99% refractory materials of W and Mo, with only 1% low glass melting additives possible (col. 2, lines 43-59). The applicant has not argued against the proper layer. The applicant has not persuasively shown that the instantly claimed sheet resistance is not present in the prior art layers. It is still the Examiners position that the refractory layer of Yamakawa when combined in Yushio will have the instantly claimed sheet resistance.

Even furthermore, it was and still is the Examiner's position that decreasing the particle size to 1-3 microns would result in lower sheet resistances. Since the combination of Yamakawa with Ito results in the particle size of Mo and W to be in this taught range, it is again the examiners position that the modified Yamakawa layer will have a sheet resistance as instantly claimed.

The applicants argue that Yamakawa do not disclose adhesive paste that contains AIN, and therefore will possess higher resistivities due to the absence of this adhesive layer. This statement is not commensurate with the rejection made by the

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Examiner. The applicant further argues that Yamakawa do not teach sintering in two steps. The Examiner was using Yamakawa as a teaching reference for the refractory layer with increased bonding strength, replacing the refractory layer of Yushio. While Yamakawa do not disclose all the features of the present claimed invention, Yamakawa is used as teaching reference, and therefore, it is not necessary for this secondary reference to contain all the features of the presently claimed invention, *In re Nievelt*, 482 F.2d 965, 179 USPQ 224, 226 (CCPA 1973), *In re Keller* 624 F.2d 413, 208 USPQ 871, 881 (CCPA 1981). Rather this reference teaches a certain concept, namely high bonding strength refractory layers, and in combination with the primary reference, discloses the presently claimed invention.

In regards to Ito, the applicant argues that Ito would not be relevant in the art since Ito teaches green bodies of AlN and not sintered sheets of AlN. Ito once again was relied upon for its teaching of particle size of refractory material for the ease in deposition of the paste refractory layers, such as those deposition techniques taught in both of Yushio and Yamakawa.

The applicant argues that the particle size distribution of Ito is used for favorable cofiring, and not for avoiding the warping contemplated in the present invention. In response to applicant's arguments, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). It is still the Examiners position that it would have been obvious to use the particle sizes of Ito in

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order to obtain ease in deposition as is known in the art of screen printing electrical pastes.

The combination of the prior art references results in the same structure and is produced by similar processes. It has been held that where the claimed and prior art products are identical or substantially identical in structure or are produced by identical or a substantially identical processes, a *prima facie* case of either anticipation or obviousness will be considered to have been established over functional limitations that stem from the claimed structure. *In re Best*, 195 USPQ 430, 433 (CCPA 1977), *In re Spada*, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The ***prima facie*** case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed products. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JONATHAN C. LANGMAN whose telephone number is (571)272-4811. The examiner can normally be reached on Mon-Thurs 8:00 am - 6:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on 571-272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JCL

/Timothy M. Speer/
Primary Examiner
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